REMARKS

Reconsideration and withdrawal of the rejections set forth in the Office Action dated May 23, 2008, is respectfully requested in view of this amendment. By this amendment, claim 1 has been amended. Claims 1-23 are pending in this application, with claims 6-23 withdrawn.

The amendment to claim 1 sets forth, in the preamble, that the adhesive composition is suitable for attaching semiconductor die to a substrate. The fluxing agent is further described as rendering the polymerizable fluxing agent inert, thereby eliminating the need for cleaning to remove flux residues. The claim further describes the composition including a diluent that is capable of polymerizing with the fluxing agent's polymerizable carbon-carbon double bonds and comprising an acrylate. The adhesive is described as having a property that, when heated, first melts and then hardens, and after hardening will not remelt if elevated to the temperate at which the adhesive first melted, the adhesive.

Claims 12 (withdrawn from examination) has similar amendments. Claim 18 (withdrawn from examination) has similar amendments relating to eliminating the need for cleaning to remove flux residues and the property that after hardening will not remelt if elevated to the temperate at which the adhesive first melted.

It is noted that, while the claims had been deemed to lack unity under the PCT for examination purposes, claims 1-23 were deemed generic.

Support for the changes is found in the original claims and in the specification, including at Page 5, first paragraph (first paragraph of "Detailed Description"). Further support is found in claim 4 (fluxing agent's polymerizable carbon-carbon double bonds and comprising an acrylate). It is respectfully submitted that the above amendments introduce no new matter within the meaning of 35 U.S.C. §132.

In the outstanding Office Action, the Examiner rejected claims 1 – 3 and 5 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,456 (Zhou et al., hereinafter *Zhou*); and claims 1 – 5 were rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent No. 6,610,759 (Chappelow et al., hereinafter *Chappelow*) in view of *Zhou*. These rejections, as applied to the revised claims, are respectfully traversed.

Rejections Under 35 U.S.C. §103

The Examiner rejected claims 1 – 3 and 5 under 35 U.S.C. 103(a) in view of *Zhou*. claims 1 – 5 were rejected under 35 U.S.C. 103(a) as being unpatentable over *Chappelow* in view of *Zhou*.

Response

This rejection is traversed as follows. To establish a *prima facie* case of obviousness, the Examiner must establish: (1) some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) the prior art references teach or suggest all of the claim limitations. *Amgen, Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); *In re Fine,* 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson,* 165 USPQ 494, 496 (CCPA 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. *See Dystar Textilfarben GMBH v, C. H. Patrick,* 464 F.3d 1356 (Fed. Cir. 2006). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. *Id.* at 1366.

Applicants' claim 1 sets forth:

> "... A thermally conductive adhesive composition devoid of fugitive solvents and suitable for attaching semiconductor die to a substrate, the adhesive composition comprising ... a thermally curable adhesive flux composition that is comprised of ... an inerting agent ... rendering the polymerizable fluxing agent inert, thereby eliminating the need for cleaning to remove flux residues ... a diluent ... comprising an acrylate ... [that] has a property that, when heated, first melts and then hardens, and after hardening will not remelt if elevated to the temperate at which the adhesive first melted.

Zhou describes a thermally curable adhesive in which, during a solder reflow step, the fluxing agent promotes wetting and simultaneously, the fluxing agent crosslinks to mechanically bond and encapsulate the surfaces. *Zhou* does not mention changing the reflow characteristics of the adhesive after initial melt. Instead, *Zhou* describes a composition which permits the material to melt and then later be re-heated for solder reflow:

> Another assembly technique involves formulating a curable adhesive composition which is solid at room temperature, but melts without crosslinking at an elevated temperature ... [T]he molten curable adhesive composition 320 can be first applied to the solder bumped chip 130 and allowed to cool and harden to form a chip/adhesive/bump subassembly. This subassembly can be applied to the substrate 100 with or without addition of any other flux. A small amount of heat may be used to soften the composition 320 so that it holds the chip 230 in place until the solder is reflowed as shown in FIG. 4. If allowed to cool, this molten composition 320 can temporarily support the chip 230 in place for chip testing or burn in. The chip can thus be easily removed should it malfunction. When it is desired to permanently attach the chip, the substrate and subassembly can be passed through a solder reflow oven thereby melting the solder bumps 340, activating the flux in composition 420, forming permanent solder joints, and crosslinking the adhesive in the composition as shown in FIG. 5. (Col. 11, lines 12-31.)

Such an arrangement is suitable for use with producing known good dice, but specifically contradicts Applicants' claim 1 in the present application:

> ... the adhesive has a property that, when heated, first melts and then hardens, and after hardening will not remelt if elevated to the temperate at which the adhesive first melted.

Chappelow is cited as describing a polymerizable composition useful for a variety of applications, including Epon 825 (a type of epoxy, formerly Shell Epon 825, now sold by Hexion). This material is cited as "useful for a variety of applications", including the actual application cited in *Chappelow* as a dental material for use with abraded or etched dentin. There

is of course no suggestion that this material be used as a component of adhesive flux. The Office Action goes on to describe the use of alloy powders (e.g., as described in *Zhou*) to add conductivity to the *Chappelow* material.

Chappelow describes a different use of material, in a different manner for a different application. In this respect, Applicants respectfully point out that a semiconductor assembly engineer is unlikely to look to dental materials as a source for fluxants. Actually, it is desired to *avoid* electrical conductivity when forming dental repairs.

To show obviousness under §103, it is necessary to show an incentive to benefit from the change. *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007).

> "The proper question to have asked was whether a pedal designer of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, would have seen a benefit to upgrading Asano with a sensor. In automotive design, as in many other fields, the interaction of multiple components means that changing one component often requires the others to be modified as well." (*id* at pp. 20-21)

In the cited combination, there is no suggestion of substitution of a comparable device or material, because there is no motivation to use a fluxant in a dental repair material and no motivation to establish electrical (or thermal) conductivity in dental repair material. Further it is clear that a skilled artisan would not have, "good reason to pursue the known options within his or her technical grasp." (*see DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006)).

The combination of *Chappelow* and *Zhou* therefore fail to suggest fails to suggest combining the high and low melting point alloys, the thermally curable adhesive flux with an inerting agent and an acrylate, as set forth in Applicants' claims:

> "... a high melting point [and] a low melting point metal or metal alloy... a thermally curable adhesive flux composition that is comprised of ... a polymerizable fluxing agent ... an inerting agent ... eliminating the need for cleaning to remove flux residues ... an acrylate, wherein the adhesive ... after hardening will not remelt if elevated to the temperate at which the adhesive first melted." (Claim 1; withdrawn claims 12 and 18 similar.)

With reference to the characteristic of the material not remelting if elevated to a temperature at which the material is first melted, this is typically not an issue addressed in dental reconstruction. Instead, the use of Epon 825 indicates a self-reacting material (with catalyst added), although actinic light may also be used at least with some of the Epon series of epoxy resins. Regardless of the particular curing techniques, there is no suggestion that *Chappelow* uses the material in solder reflow, no suggestion that the *Chappelow* material be heated during a bonding process and no suggestion that *Chappelow* be used in any sort of flux operation.

Applicants therefore respectfully submit that the *Zhou* and references do not teach or suggest all the features as recited in claims 1-5 of the present invention. It is therefore respectively submitted that the rejection under 35 U.S.C. 103(a) should be withdrawn. Applicant respectfully request that the Examiner withdraw the rejections and the case be passed to issuance.

CONCLUSION

In light of the foregoing, Applicants submit that the application is in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicants respectfully request that the Examiner call the undersigned.

Respectfully submitted,
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